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JAN 8, 1868
OF HYGIENE

WAR DEPARTMENT,
SURGEON GENERAL'S OFFICE,

WASHINGTON, D. C., 31st January, 1868.

To

BREVET MAJOR GENERAL J. K. BARNES,

Surgeon General, U. S. Army.

GENERAL:

I have the honor to submit a digest of the reports made by medical officers of the army called upon by this order, issued to Medical Directors in August, 1867—

"SIR:

"You are respectfully requested to call upon medical officers of experience, serving under your command, for their opinions regarding the hygienic fitness (for the localities where they are now on duty,) of the present uniform and allowance of clothing for enlisted men, and to invite suggestions for its modification. You will please collect these reports, without delay, and transmit them, with your remarks to this Office.

"BY ORDER OF THE SURGEON GENERAL:

"C. H. CRANE,

"Assistant Surgeon General, U. S. Army."

These reports are made by more than one hundred and twenty professional men, representing nearly as many stations east of the Rocky Mountains, and offer, by their agreement on the general principles and their divergence on subordinate points, striking evidence of the interest the subject excites and the wide-spread and serious evils belonging to the present system.

[Since this paper was submitted the reports from the District of New Mexico and the Departments west of the Rocky Mountains have been received. These increase the total number of reporting officers to one hundred and sixty-eight. They substantially agree with those made under similar climatic influences as already represented. Any specially inter-

esting feature will be interpolated, in brackets [], under its appropriate heading. The condemnation of the hat and the fit of the clothes is all but universal, and the quality of the garments, especially on the Pacific, is very severely commented upon.]

Assuming that no change in the kind or quantity of clothing now prescribed is attainable, the most general subject of complaint is its quality. The same article appears to vary in character at different posts, but each is condemned by some one or another, and the more important by nearly all. Equally prominent is the shameful carelessness in the cut and make. It has even been suggested that the original standards have been lost, so far do the articles issued depart from the wants of the men. All who allude to it regard it as a serious hygienic defect that the men cannot be reasonably comfortable, until the clothing provided by government is remade or substituted by other at their personal (and often great) expense.

While it may be difficult to trace positive illness to these causes in any considerable number of cases, the general efficiency is weakened in proportion to the discomfort of the mass. The men become dissatisfied, consider they are neglected and defrauded, positive hatred to the service is sometimes engendered, and the discipline and morale of the army are materially impaired. It is urgently recommended that the quality of the material be improved and the sizes and patterns of the coats, blouses and trousers be re-adjusted and increased in variety. The numbers [sizes] of each called for in the respective requisitions should be rigidly adhered to in the supplies issued, and where alterations for individuals are necessary the charges of the company tailors be limited or the work performed at government expense. The special advantages and defects of the various articles will be referred to under their appropriate heads, but for the considerations of the hygienic value of Comfort you are respectfully referred to *Statement A*, and, for the general character of the uniform and its effect upon the men as now issued, to *Statement B*, which consist of the special opinions on these points, generally in the words of the reporters.

The foregoing is upon the assumption that the present uniform must be retained. But outside of a narrow belt, occupied by a very small portion of the army, it is condemned by nearly every one.

The following is a discussion of its component parts.

HAT AND CAP.

A very respectable number stationed between the fortieth and forty-second parallels silently acquiesce in the present head-covering, but elsewhere it is the subject of general complaint.

Proportionably to the exposure of the head to heat and the confinement of its exhalations, is the tendency to cerebral oppression and disease. In northern climates all the well-known effects of cold follow the absence of adequate protection.

The hat is objectionable from its size and its great weight and want of ventilation, evils that grow in importance with the lowness of the latitude, until finally the head is oppressed by a constant, close vapor-bath. In point of practice at nearly every post south of Washington the hat and cap give place in warm weather to a lighter substitute, generally of straw. On the northern frontier it does not adequately protect the ears in winter.

The objections to the cap are, the difficulty of cleansing with soap and water, owing to the pasteboard it contains, the interference of the oblique visor with vision, its want of grip, for the northern stations in winter its want of warmth, the deficient protection it affords the face and neck against sun and rain in any climate, and, especially, the absence of ventilation and the transmission of solar heat by its resting directly upon the top of the head—an evil that is aggravated by its color.

The suggestions for relief all point to the necessity for increased lightness and ventilation in warm climates and to greater protection in cold regions.

They are chiefly these:

1. Authority to wear on all occasions an ordinary light straw hat during the warm weather, a period that varies with the locality. The value of the straw hat consists in its lightness, its porosity and its defense against the direct rays of the sun. But it is not readily transported, is fragile, is rarely sightly, is somewhat inconvenient in the exercises of the manual, cannot be slept in, and is unsuitable for cold weather. Its general informal use is due to the necessity of substituting *something* for the uniform, its accessibility, and its low cost.

2. For dress a stiff hat, resembling that formerly worn in the army and lined or unlined according to season, with a woolen pom-pom, as shown in the accompanying illustration (*Fig. 1*). This is easily lined, is susceptible of ventilation and ornamentation, and is generally associated with notions of soldierly appearance. Its chief defects are its weight, its inadequate protection for the ears and neck, and its unyielding structure.

For fatigue, a cloth bag cap, such as is worn in the French and Austrian services and shown in the accompanying illustration (*Fig. 2*). This, which may be



Fig. 1. Stiff Dress Hat.

regarded as the natural complement of any stiff hat, is admirable for its portability, being transportable in the pocket, and for its adaptation to sleeping and to many fatigue duties. The side flaps may be turned down at night and in cold weather, but the cap is not suited for exposure to the sun in hot climates.

3. The Scotch or Glengarry cap with a visor, as advocated by Dr. Parkes for the British Army (*Fig. 3*). This is recommended for ours from its lightness, its portability, its coolness in summer by being

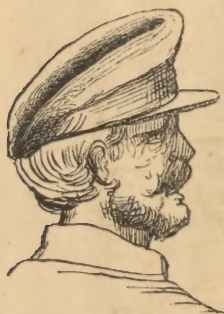


Fig. 3. Scotch Cap with Visor.

set upon the top of the head, its warmth in winter by being pulled down over the ears and back of the neck, and its capability of being slept in. It is imperfectly illustrated here. It also allows the addition of a fur band, that may be turned down, in cold climates and a capote can readily be pulled over it. (The bag cap possesses these last two advantages, also.) It has the very serious defect, but no more than the present cap, of not shielding the sides of the head, face and neck from the sun and



Fig. 2. Cloth Fatigue Cap.

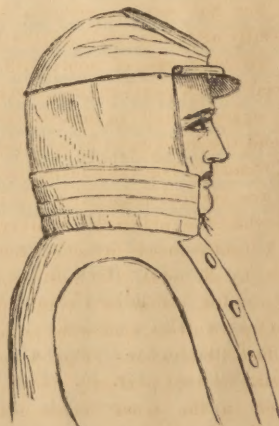


Fig. 4. The cap with an additional piece of cloth, as used in winter on the plains.

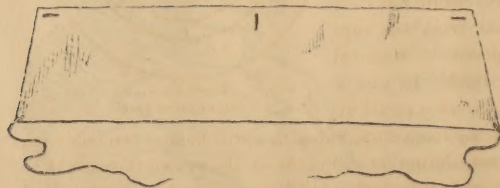


Fig. 5. The cloth detached from the cap, showing its attachment by button holes and tapes.

rain. With whatever cap is worn in hot climates a long broad Have-lock, properly made of white linen and quilted half an inch thick, must be worn to



Fig. 6. External view of the Ventilated or Eastern Hat.

4. For hot stations either a kepi or casque or light brimmed hat, essentially after the style of the Malay hat. To be made of some stiff, light material with a pearl-colored cover and an air-space of half an inch between the ring and the head, as is here illustrated (*Figs. 6 and 7*). The exact form, for which there are several suggestions, is immaterial while the principle is adhered to.

5. A light-colored, brimmed felt hat. This is, by all odds, the most generally recommended, either as a simple felt or looped up for dress, somewhat as in these imperfect illustrations (*Figs. 8 and 9*). This may be kept perfectly simple, or be adorned in the most ornate manner. The brim should have a width about equal to the height of the crown.

Probably the most serviceable hat ever used in the United States Army was supplied the Second Dragoons by General Harney, in Texas, in 1853. It was a broad-brimmed, soft felt, of a pearl or stone color, capable of being looped up, but with a stiff brim when let down, and with an orifice for ventilation on each side of the crown that might be closed at pleasure. This was exclusively used for scouting, but if authorized it might well be used for all purposes. It appears to combine all the essentials of protection and comfort and not a few elements of beauty.

protect the back of the neck and occiput.

In cold climates in winter the contrivance reported by Bvt. Lieut. Colonel Alden, as used by the troops on the plains, would be a valuable addition to an ordinary cap. It consists of a piece of wadded cloth, to be attached, by means of three button holes on the upper edge, to the buttons on the sides of the cap and to an extra button sewed on the middle seam behind, and tied beneath the chin by tapes attached near the lower front corner.

The shape and application are illustrated in *Figs. 4 and 5*.



Fig. 7. Sectional views of the Ventilated Hat.

[Further investigation has shown that the hat here spoken of was designed during the Mexican War by Colonel T. P. Andrews, (Paymaster General, retired, very recently deceased,) then commanding the Voltigeur Regiment. A number



Fig. 8. The Three-Cocked Hat.

of this pattern were made but, not being sent out in time for issue in the campaign, were stored until



Fig. 9. The Cocked Hat, held under the arm.

obtained by General Harney as just mentioned. No specimen of this hat can now be found in the Quartermaster's Department, or elsewhere, but, after this report was originally submitted, a model hat was constructed on this plan, from information received from Colonel Andrews and from officers who had seen and men who had worn the original. It is picturesque and soldierly when cocked; it affords the amplest protection from sun and rain when turned down; it can be laterally flattened for transportation without detriment. Three views of this hat illustrate these characteristics (Figs. 10, 11 and 12). The model, now deposited in the Army Medical Museum, was made, by direction, by Wm. R. Cole & Co., hatters, of Baltimore. It is believed that this hat is the most appropriate that has been proposed. The manufacturers estimate that it can be furnished of good quality at a wholesale cost not to exceed two dollars and a half.]



Fig. 10. The Andrews Hat, as generally worn.

A gray, light felt hat of some description is, without

doubt, the most serviceable and should be fairly tried. There might be



Fig. 11. The Andrews Hat, in the rain or excessive solar heat.

expense to the government or soldier. [Several officers in Arizona recommend a light-colored brimmed hat, the under side of

the brim to be lined with green as a relief for the eyes from the glare of the sun in that verdureless region.]—An experimental issue of the Malay style



Fig. 12. The Andrews Hat, compressed for transportation.

might be tried, but it is probable the Harney [Andrews] hat properly made would fulfil every necessary indication. But whatever covering is worn it must be light in color and be raised from the crown, to save the soldier from the disastrous effects of direct solar heat and confined hot air. * * *

The views expressed by medical officers are given in detail in *Statement C*, to which reference is respectfully invited.

LEATHER STOCK.

The stock has been ignored by a majority of the reporters. This omission cannot be considered an approval even by silence; but occurs because the stock is so generally discarded in practice that very few regard it as part of the uniform. But the letter of the regulations still demands it, to the great inconvenience and frequent injury of the men.

It should be discontinued as a relic of the artificial stiffening of soldiers that ought now to be superseded by physical training, and because of its great discomfort and its positive evils in excoriating the skin, inducing disorders of the larynx, interfering with the natural motion of the neck and causing cerebral congestion by the compression of the vessels. Experience has led most of the other great military powers to abandon it; and sailors, whose necks are peculiarly exposed, wear nothing of the kind. But a single medical officer has reported in its favor, and he has offered no reason for its continuance.

The opinions presented will be found in *Statement D*, arranged according to the rank of the writers, regardless of the Military Departments.

COAT OR JACKET AND FATIGUE SACK.

The outer garment for the body and upper extremities has always proved the most difficult of management in any uniform. This arises from its being the most important single article of clothing, and the one upon which chiefly depends the *uniformity* of appearance. To preserve that uniformity and to sacrifice neither the comfort nor efficiency of the soldier, nor to unduly increase his expense to the nation, is a problem not yet satisfactorily solved at home or abroad. The peculiarities of our service add to the difficulty of its solution, for we require a garment suited to the most varying temperature and capable of being carried by the soldier the greatest distances at the shortest notice, and equally adapted to an active Indian campaign or the parade of a permanent garrison.

An efficient soldier should at all times be prepared to carry his vital accessories of arms and ammunition, clothing and a few days' food—and the tactics in use imply that the mass of our army is *light* infantry. Weight is, therefore, of the utmost importance, every superfluous ounce carried being, to the same extent, a loss of effective force; and it is practically out of the question for the soldier to be burdened with two or more suits for the various latitudes through which he is liable to serve.

The present tight-fitting, wadded, uniform coat receives estimates varying with the location, but for use through all seasons objection is found by almost every reporter. In those few cases where it is approved, the blouse and coat appear to be regarded interchangeable articles. The primary, radical and insuperable objection to the coat is the tightness of its fit, which involves an almost unvarying amount of clothing throughout the year and renders excessive muscular action almost impracticable. Where it is persisted in for ordinary duty, careful returns of the British army show, for troops clad much as ours, an alarming degree of disease and mortality traceable directly to the constricting coats and badly distributed weights. Notorious experience has illustrated the impossibility of fatigue or campaign duty in such a costume. In the South, owing to its thickness, it is insufferable in the warmer months. The catalogue of objections embraces, compression of the vessels of the neck by its thick

and bungling collar, constriction of the chest, prevention of evaporation of the perspiration and absorption of its confined fœtor, oppression by excessive weight and heat, and liability to induce disease when left open. The reports from the southern stations represent with almost pathetic earnestness the serious consequences following its use in the summer. The plans proposed for the relief of this suffering are very numerous and, together with the detailed and serious objections to the present coat, will be found in *Statement E*.

Almost unanimously, the reporting officers repudiate the heresy that the use of clothing is to hold the soldier in position. They take the view that his martial bearing is to be acquired and retained by careful military training, and not by adventitious stiffening at the expense of health.

A combination of the qualities demanded and advantages offered in the various reports is to be found in the garment here proposed.

A loose habit made with a yoke, so as to fit well but leaving the neck entirely free: large at the shoulder and in the arm, for the most unconstrained exercise of a muscular man, and small at the wrist; very full in the body, with longitudinal plaits in front and with full short skirts; the whole to nearly resemble what is known as the Swiss blouse. It should have these features also:—a collar to turn over about an inch and a half; to be lined throughout, or not, according to climate; to have stout pockets in the body accessible at the plaits; to be fastened at the waist by an inner belt, as is now commonly provided in the officer's coat; to have a broad belt between the body and the skirt, upon which the waist belt of the accoutrements should fit accurately and remain in position; and, possibly, stout pockets with lappels and buttons below the waistbelt, that might dispense with the cartridge-box when the metallic cartridge is employed. The ornamentation of this dress, which can be carried to any required extent, does not come within the scope of this report. A tolerable conception of the proposed coat may be had from *Figs. 13 and 14*.

The fabric should be closely milled, light woolen cloth or, preferably, navy flannel, securing a warmth a little greater than the present fatigue sack. (Besides decreasing the weight, the advantage of closely woven cloth is the ability to have brushed from it dust and other adherent matter, instead of receiving these substances into its texture, to be removed only by washing, as is now the case. Inquiry has found that cloth of desirable texture much better woven can be supplied at the same cost as that now used.)

The most formidable objection to the proposed garment is its innovation in departing from the rigidity of the British and Prussian type, so long regarded the necessary model in the military world. That type is the joint-heir of metallic armor and of a martinet genius.* With equal propriety we might adhere to cuirasses and queues. The day of monitors

*It is due about equally to ideas of association propagated from the time of coats of mail and to the irrational teachings of the Great Frederick.

afloat and iron casemates ashore, of twenty-inch guns, of Marches to the Sea with the base of the army *in* its moving columns, is not one in which to condemn a hygienic or military suggestion because of its novelty.



Fig. 13.

Fig. 14.

These cuts present a general but imperfect notion of the proposed coat, and *Fig. 14* is particularly faulty. The original photographs from life show the front to be smooth and well-fitting, without being constricting, and to have the cord on the plaits in regular and straight lines. The shading of the cuts conveys the impression of an undue flexibility of material, such as would be found in unstarched muslin.

But, in truth, it is less an innovation in fact than in appearance. The authorized fatigue sack, so commonly worn in the late campaigns, is but an uncouth type of this more appropriate and serviceable habit. The frock or smock of the native and foreign laborer, the hunting-shirt of the frontiersman and forester, the blouse of the tourist, the loose pea-jacket of the sailor are, all, the natural offspring of conjoined necessity and convenience with men who spend much time in physical exercise in the open air.

The chief and essential advantages to be gained through it are, unconstrained muscular exertion and the adaptation of clothing in conformity to the climate without interfering with uniformity in appearance. The existing uniform only permits change by imposition of outer garments. That proposed interposes no obstacle to overcoats and allows, by the increase or diminution of underclothing, a style of dress reasonably conformed to health and comfort. It is in this attribute its special claim to consideration is found. By being made sufficiently loose to wear beneath it, if necessary, three woolen shirts and a waistcoat it will be adequate, with proper outer clothing in inclement weather, for any ordinary service to which a soldier can be called. By reducing the undergarments, it will be no more oppressive at the hottest posts than any possible clothing must be. The system of proportioning the clothing to the actual temperature is practised by every community except the military. This particular method of effecting it is habitually employed by that sagacious people, the Chinese, and, among our own citizens, by the Maine lumbermen who spend the length of an unequal season remote from their homes. The character of the shirts and waistcoat to be worn under certain circumstances will be described hereafter. An additional advantage inherent in this garment is its lightness, whether as worn or carried in the knapsack.

The long skirts of the present frock-coat have an argument in their favor in the supposed protection they afford to the abdominal viscera, which is refuted by the fact that cavalry and light artillery are not found more susceptible than infantry to diseases of those organs. On the other hand, as these skirts are confessedly inconvenient under most circumstances, and as their length adds to the cost of the clothing, it has been advised to adopt the jacket for all arms, as was done by some New York troops during the war. But, besides the difficulty of preserving a neat appearance in troops who move on foot, this at once revives all the difficulties of tight-fitting clothes already discussed. The short skirts proposed are open to neither objection.

Apart from the hygienic advantages offered, the suggested system is economical. In changing station it is easier to procure and carry underclothing, either in bulk or issued, than it would be to obtain another style of coat (and the necessity for the clothing to correspond with the climate

is undeniable); or, should a part of his outfit have to be sacrificed, the soldier could better lose the less costly.

Some officers, insisting upon a separate issue for the summer, advocate linen or cotton, preferably white in color. This is not approved, however, either by the majority or by the experienced. Cool nights, heavy dews, malarious influences are so prevalent in most regions that the well-known qualities of wool must be made use of.

The color is less easily settled. Experiment shows that the color and not the texture of the cloth is the quality most intimately affecting solar heat. Dark blue is next to the hottest and the difference between it and gray is six or eight degrees. Furthermore it is conspicuous, rendering the wearer very liable to be struck in battle. For these two reasons, both important, it is recommended that Cadet gray or a very light mixed blue, approaching a neutral tint, be adopted.*

For the northern frontier where, owing to climatic and topographical reasons, the garrison cannot be suddenly moved, it may be proper and would certainly be feasible to make a special issue of clothing of extra thickness in accordance with the exceptional nature of the posts. There could also very properly be allowed a heavy, knit, woolen shirt for the very cold posts.

This costume or one embracing the same principles is very strenuously advocated as essential not only to the best development of the effective qualities of the soldier, but as positively necessary to save him from much suffering and sometimes from disease and possibly death.

The effect of ornamentation upon the morale and esprit of the soldier is not to be despised as a hygienic element, although the exact character of such additions may not properly be treated of here. It is suggested, however, that the light neutral tint here proposed will receive almost any marked color upon it, and that white braid for infantry would be pleasing in appearance and not be difficult, with the aid of chalk, to keep clean. For the other arms the present distinguishing colors can as well be used. For the mounted troops the present shell-jacket, the color being changed, might be retained for dress occasions, and, if it is insisted on, a coat of almost any description and ornamented to any required degree might be used by troops in garrison for exceptional full dress, upon the unalterable condition that it shall never be carried in the soldier's knapsack nor be worn on the march or on ordinary duty.

For some suggestions upon the manufacture of the cloth and the clothing, attention is respectfully invited to the latter pages of this report.

Those officers who have alluded to them in distinct terms, recommend for the colored troops a loose Zouave style of dress. If the proposed coat is adopted there will be no hygienic reason why they should be clothed differently from the others, but it is probable a uniform judiciously ornamented would be gratifying to their peculiar tastes.

*Dark cloth is inferior in strength, softness and smoothness.

For the expression in detail of the reporting medical officers, your attention is respectfully invited to *Statement E*. The reports from the South and from the North-West are equally worthy of careful study. In accordance with your authority and by the courtesy of Brevet Lieutenant Colonel Otis, Curator of the Museum, I have been able to have made two specimen coats exhibiting most of the features advocated in this report as essential. [These models may be found in the Army Medical Museum.]

SHIRTS AND WAISTCOAT.

The underclothing for the body is naturally considered in conjunction with the coat. Before the war a large white flannel shirt was issued and it is continued as part of the allowance. There are also furnished one of very coarse bluish gray flannel and a coarse knit one. These are of the same texture for every post, and seem recently to have been issued in some sections to the exclusion of the white flannel. At the north they answer well enough, but in the south, where the body is so frequently bathed in perspiration, the softened and tender skin is irritated in the most excruciating manner by their coarseness and the cutaneous affections of which they are the direct cause. The shirt is the very garment that, on all sanitary considerations, should vary both in quality and number with the latitude. It hardly seems necessary that both the white and the gray should be issued, but at least three separate grades and many sizes ought to be furnished. A thin soft kind for hot weather in the south, a medium quality for temperate stations, and a very thick sort for the northern winters.

Upon this, the real personal garment, should depend the conformity of the clothing to the climate. This is the fulcrum upon which to apply the sanitary lever that regulates the prevention of disease. With the proposed coat it will be perfectly feasible to comfortably wear several shirts at the same time if the exigencies of the season so demand, and it is to this feature and this mode of dress as distinctive and as a marked reform that careful attention is especially invited. The manufacture of the different grades and sizes would make little, if any, difference in the aggregate cost, their issue could be arranged with small trouble or expense, and, with proper care by the company officers, the men could at all times be comfortably and healthfully clad.

Professional opinion so greatly favors flannel as their necessary material that no elaborate argument thereupon is necessary. The general reasons for its use are its conduction of heat and its superior absorption of moisture. It is also supposed to exercise special protective influence against malaria. The objections are its tendency to cause undue perspiration, difficulty of washing and the liability of all woolen goods to convey septic disease. It is also charged with predisposing to acute rheumatism.

Excessive perspiration is guarded against by proper grading according to season; washing is rendered easy by the introduction of about thirty-five per cent. of cotton in the material, which does not seriously disturb its other peculiar qualities; and a due regard to cleanliness compelled by the company officers will provide tolerably against the propagation of disease.

Whatever foundation there may be for the fear of rheumatism is probably due to the profuse perspiration caused by excessive thickness, for which the remedy is obvious. The darker colors, while having no effect upon the temperature of the body are believed to absorb animal odors better than the lighter hues. It is therefore recommended that the shirts be blue or red.

The importance of length must not be overlooked. The shirt must reach to the middle third of the thigh and not, as at present after washing, but a little below the navel. The abdominal viscera are the organs most sensitive to changes of temperature, and cholera-belts may be dispensed with if the proper precautions are taken as to the original sizes. It is suggested, as a matter of appearance rather than of hygiene, that it would be well to make the shirts with a neckband, to which may be attached at pleasure a white flannel or muslin collar and which would prevent any undue constriction by possible shrinking. The present clumsy collar of the blue shirt is usually removed by the men for the sake of comfort.

For opinions in detail see *Statement F*.

There should also, to render it complete, be added to the uniform one long woolen or lined heavy flannel waistcoat with sleeves and extending low down on the abdomen, not tight but fitting fairly and provided with pockets. Besides affording a convenient addition in sudden changes of temperature or exposure at night, it may be used without the coat in ordinary drills or fatigue duty. This is looked upon as very important, and the suggestions received on this point may be found in *Statement F*.

It is further recommended that on the northern frontier there be a special issue in the winter of a thick, closely knit, woolen jacket or Spencer.

TROUSERS.

The clothing for the lower extremities is discussed by the reporters in precisely the same style as is that for the body.

The legs appear better able to withstand hot clothing and are never so cruelly constricted as the chest containing the vital organs, but the undeviating thickness of the heavy trousers, to which there is not even the analogue of the blouse, is a source of severe complaint throughout the entire warm season. Equally is it deficient for health and comfort during exposure to the piercing winter winds of the plains, although, except at the almost arctic posts of the British American frontier, this is attributed to the criminal inferiority of the cloth now supplied.

The arguments for and against the various fabrics and colors are substantially the same as those already presented. The usefulness of the white linen or duck which some recommend is, even by its advocates, limited to the summer service of permanent garrisons in peace, leaving troops in the field exposed to the present evils. Duplicate sets of pantaloons can be carried no more readily than duplicate sets of coats, and perhaps are even less necessary. But beyond the difficulty of keeping white clothes unsoiled, and the constant risk to health that vegetable rather than woolen tissues offer, it appears that starching, which is essential for the preservation of their appearance, makes the fabric practically impermeable and almost neutralizes the prominent advantage of rapid evaporation and consequent coolness.

Having in view the essential conditions of the American soldier's service, as treated of in the earlier pages, the practical deductions are that a rational system demands woolen trousers of thinner cloth, more closely woven or milled, and of a greyish blue color, [officers serving in the muddy regions on the Pacific advise dark blue, at least during the rainy season,] and that the proper degrees of warmth are to be attained and preserved by the employment of drawers of different grades according to the climate, and, in very severe weather, by the use of more than one pair.

The form generally advised for foot troops is the formerly fashionable and very useful "peg top." They should be large over the pelvis, to permit the evaporation of perspiration and room for the extra shirts and for deep and ample pockets let in at the seam, and narrow at the ankle to keep them out of the mud of marches and to permit their stowage within boot-legs or gaiters. The distressing condition in which the men go into camp after a march through muddy roads with the full-bottomed pantaloons unprotected, appeals very feelingly for every possible relief from the disgusting effects of mud and water.

Braces are advised by a few officers, but the complication they involve does not seem to be sufficiently compensated by their advantages to induce their recommendation. By being cut so as to be supported by the hip bones, any undue abdominal pressure would probably be avoided, and it is believed an inner broad belt can be so arranged as to present a secondary means of support. The most serious difficulty in supporting the trousers at the waist is, that the constriction stops the perspiration of the body in its downward passage, producing possibly unpleasant chafing and cutaneous irritation. In a degree this is a necessary evil, but with proper regard to the other garments it need never be of long continuance.

The matter of length is, however, a serious one. There is general and unquestionably well founded complaint that at present men of six feet cannot, ordinarily, find pantaloons large enough, although before the war

size 4 was ample. It is recommended, by the advice of those having personal experience, that the following standard be adopted:—

Size No. 1, length of inner seam 28 inches.

“	“	2,	“	“	“	“	30	“
“	“	3,	“	“	“	“	32	“
“	“	4,	“	“	“	“	34	“
“	“	5,	“	“	“	“	36	“

It is also advised that, for all foot troops of the line at least, there be added to the allowance one pair of loose stout overalls, somewhat like the canvas issued to the engineer troops but lighter; or, better, like those ordinarily worn by masons and other mechanics in civil life. These should be brown in color and could be used on some forms of fatigue duty over, or, in peculiar weather, in lieu of, the trousers, saving them in wear and tear and in appearance, adding to the comfort, and ultimately lessening the expenses of the men.

For mounted troops the reinforced, full-bottomed trousers are recommended. It would be manifestly impracticable to wear the narrow pantaloons over the boot-leg and we find, even with the style now issued, the men invariably have the bottoms enlarged to attain that end. In the garment as issued the saddle-pieces should be turned in, and not left with the ragged edge which, with the present quality of cloth, rapidly frays out requiring the men to have them re-sewn at their own expense. It is further recommended that for certain frontier posts where the scouting duty is known to be rough there be issued as company or post property enough well-dressed, light, leather overalls, similar to those used by the border Mexicans. Their use would promote the comfort and add to the efficiency of the men, as well as, at some stations, save them much expense in the frequent replacing of trousers.

For the northern lines, where garrisons cannot be suddenly changed, the same recommendation for the employment of specially thick cloth is made that was offered in the case of the coat, and for the same reasons.

The additional recommendation is pressed with seriousness, that for the exposed north-western posts, where experience has demonstrated their necessity, large and warm leggings be furnished the troops serving there. At many places they are now used, being obtained from the company fund or at the private expense of the men. Their employment, however, ought not only to be informally tolerated but should be explicitly prescribed and provided for at government expense. In whatever manner they may be held, and that is a matter foreign to this Department, there is no doubt of their necessity as protection against the fearful rigors of the climate. The sick reports carry too many men disabled by cold to question the advisability of such an addition—one that all frontier experience shows adopted by civilians, aboriginal and naturalized, and by those armies

whose troops are similarly situated. They should be of thick blanket material, or, better, more durable and probably cheaper, of buffalo hide tanned with the hair on.

DRAWERS AND STOCKINGS.

With whatever favor the general views here advocated concerning the proper method of clothing soldiers may be received, it can not be disputed that drawers and stockings of unvarying warmth cannot always be equally suitable. The soldier avails himself of their concealment by the outer clothing to indulge in various modifications, improvements and otherwise. These natural promptings and the suggestions of science unite in the following recommendations.

The drawers, like the proposed shirts, should be of at least three grades and many sizes. One, thin and soft, with a large percentage of cotton in the fabric, to be worn in the hot weather; another quality, of about the same warmth that those now issued are when new but of better material, should be supplied for the ordinary service of temperate climates; and a very thick warm variety for the colder stations. The foundation of all should be wool, and the last-mentioned should be of it alone and of the very best quality. It might, furthermore, be advisable to have an extra grade of thick knit woolen specially made for the extreme posts.

The present drawers in combination with the present trousers are so oppressive in warm weather that the soldier often yields to the temptation and discards the former, to the prejudice of his health and ultimately of his comfort. The dusty cloth trousers become saturated with perspiration and are quickly filthy, while the unprotected legs are provoked by the most annoying irritation and excoriations, from their heat and coarseness. Company officers should be held responsible that their men always wear drawers, but, that they *may* always be worn, there should be a grade sufficiently light for the warmest climates. That wool should be the staple of the fabric is required by the same reasoning that has been applied to the shirts, with the additional one that the double fold made by it and the shirt over the abdomen would in many cases supersede the cholera-belts so often necessary. Why they should be of different grades is but a recapitulation of the previous argument: adaptation to locality, ease of transportation, and trivial loss and inconvenience if something must be sacrificed.

The shape should be that of the proposed infantry trousers, and they should be fastened at the ankles with tapes. The interference with the circulation by ligation would be very trivial after a little experience, and the convenience of keeping both the drawers and the stockings in position, which cannot always be done with the button alone or with no fastening, amounts sometimes to a necessity.

The opinions of officers given in detail will be found in *Statement II*.

The stockings, which are now woolen but generally miserable in texture, should be of cotton for the south and for the summer and of wool where it is cold. Stockings in warm weather are chiefly valuable as agents of cleanliness, and the thick wool completely counteracts this use. Many persons and many cleanly persons can wear wool only at the expense of scalded feet, and such soldiers are obliged to substitute cotton socks bought at their own expense. The woolen sock is suitable for warmth in very cold weather, but to be adequate to the end proposed should be made to extend nearly to the knee. A very distressing case is cited from Fort Sedgwick where a man lost both legs, frozen in a scout, by the drawers riding up and the socks slipping down—and this cannot be an isolated occurrence.

Officers' opinions are to be found in *Statement H*.

SHOES, BOOTS AND GAITERS.

The model or type of the army shoe seems well adapted to the ordinary service of the soldier, but modifications to its disadvantage have become engrafted during the Rebellion so that the shoe as now issued is much below the standard in material and fit. The evils are chiefly those that can be remedied by rigid inspection in the Clothing Department. As it is now, the majority of the men buy their shoes from private hands at higher rates for the sake of comfort and ultimate economy.

The heel should be broad and low, the sole sufficiently narrow to permit the sides adequately to support the foot, and the toes wide enough to avoid compression. A shoe that permits much movement of the foot in it is nearly as bad as one that compresses the foot. [In sandy regions the shoe would be a better protection if the tongue were made higher.] The quality of the leather is, in many cases, very bad, and in some it is charged that the soles are largely made of paper. It is certain that not unfrequently they wear out and strip off after very little exposure. [In excessively hot, dry and stony regions, as in Arizona, the ordinary shoes rapidly wear out: the soles coming off by the threads being quickly cut through, or by the pegs loosening through contraction. The French screwed shoe has been advised from there.] The shoe is issued exclusively to infantry and the boot to cavalry.

But with the shoe for ordinary service should be used the gaiter. Marching troops in the late war evinced a decided preference for the gaiter in some shape, and when it could not be drawn they thrust the trousers' legs within the stockings. In all marches in the mud this was a necessity, although only partial in the relief it afforded. Properly applied gaiters protect the feet from dust and sand, but their greatest value is in enabling the wearer to go into camp with clean stockings and trousers and in the advantage for health that dryness and comparative warmth possess

over the wet and mud and discomfort their absence implies. It was believed by many of the men that the bracing effect of the pressure was an aid in marching. The best kind is probably the light "half dressed" leather fastened by buckles.

But the shoe, even with the gaiter attached, is inadequate to the proper protection of the foot in the northern winters. No shoe will answer in the drifting snows that are found everywhere north of the latitude of New York, and the very severe weather of some posts demands extraordinary protection. Where the snow is deep the men are *permitted* to buy at their own expense and to wear boots like those that civilians find necessary, but every principle of justice requires that they should be provided with the clothing requisite for their health and ordinary comfort. It is therefore recommended almost unanimously by officers at those posts that boots be allowed in winter. [The same recommendation is made where they are exposed to the deep mud of the rainy season on the Pacific.] For a discussion of the means proper to meet the extraordinary severity of the winters along the lakes and in the Departments of Dakota and the Platte, attention is invited to the closing pages of this report.

The cavalry boots are open to the same objection as the shoes in the material and workmanship, and, besides, are deficient in the size of the legs. These are so narrow that the trousers cannot easily be retained in them, and so short as to be bad in appearance and to permit the rain to soak in from the knee. If made wider they would be vastly more comfortable, and if longer would add to his appearance and would better protect the trooper. The adoption of jack-boots would permit the cavalryman always to wear trousers of the same cut as the infantry soldier and would be a characteristic as well as desirable dress.

It is respectfully suggested, in view of the inferiority of the shoes and boots so long issued and of the good quality of the leather work made by the Ordnance Department, that the enlargement of their works to embrace shoe factories would be warranted for the sake of the soldier, and that the employment of company or post shoemakers would enable the men to be always well shod, to the greater efficiency and economy of the army.

For the views of officers on shoes and gaiters, attention is invited to *Statement I.*

GREATCOAT.

The greatcoat is now issued of two patterns, sufficiently well known to require no special description. In the opinion of most of those reporting thereon, the advantages of that now furnished mounted troops are so great that they recommend its issue to all arms. This would insure a double-breasted coat with a long cape and long skirts, and, as the garment is designed for warmth and to protect from the weather, these features are very essential to its perfection. Officers serving in the north generally

recommend it should be lined throughout with heavy flannel. Its value in winter would be much increased thereby. It is also recommended, and to this special attention is invited, that a detachable hood be added, that in rigorous weather may be made to protect the head and neck by being drawn over any ordinary head-gear. Soldiers attempt this now by drawing up the cape and tying the corners under the chin, but this is clumsy, is only partially effectual, and often deprives the chest of shelter at times when it requires it as much as does the head. By making it fuller in the waist, like the Russian coat, pockets can be inserted in the skirts, either in rear or in the sides—an addition of some convenience. The addition of a fur lining to the collar should be officially authorized for the northern winters, instead of, as now, informally permitted.

The question of Buffalo overcoats will be discussed under the head of Additional Articles.

The quality of the cloth in the coat now issued is generally pronounced to be very inferior.

There are some reasons why it would be well to change the color to a dark blue, which will be discussed further on, but none of important hygienic consideration.

Opinions of officers will be found in *Statement K*, where they are arranged in the usual order in the Departments of the East and Dakota, and in the order of rank in the Corps, regardless of geographical divisions, for the remainder.

BLANKETS AND WATERPROOF CLOTHING.

The general complaint regarding blankets is their comparative worthlessness, as now issued. This is a matter of such notoriety that it is considered unnecessary to adduce specific proof. If any is required it can best be obtained by examining the kit of any soldier taken at random from the nearest garrison. For the colder stations this becomes a very serious matter, which is generally remedied by the soldier at his private expense. The present allowance of one (1) for the first and one (1) for the third years is manifestly insufficient, especially when the quality is considered, for any post where the weather is at all severe. Good woollen blankets at reasonable rates should be supplied, and it is suggested that the California blanket, or the Hospital blanket of the quality used before the war, be the standard. For troops serving in the West, the buffalo robe is cheaper and better and its supply in the trans-Mississippi Departments is advised.

The waterproof covering now allowed is, each year, one blanket for foot troops and one poncho for mounted men.

Their value is best stated in the words of Dr. Parkes, of the British Army, the eminent writer on military hygiene. "Like leather articles,

the india-rubber is an exceedingly hot dress, owing to the same causes, viz: impermeability to wind, and condensation and retention of perspiration. It is objected to on these grounds, and especially the latter; * * * * * If, however, woolen underthings are worn, the perspiration is sufficiently absorbed by these during the comparatively short time waterproof clothing is worn, and the objection is probably not valid, unless the waterproof is continually worn.

The great use of waterproof is, of course, its protection against rain, and in this respect it is invaluable to the soldier, and should be largely used. By the side of this great use, all its defects appear to me to be minor evils."

It is recommended that the present allowance be continued.

[The Territory of Alaska is so exceptional as regards rain that a special allowance should be made for that district. Assistant Surgeon A. H. Hoff, who accompanied the Expedition of Occupation, considers that "outside india-rubber covering is indispensable." He recommends that "a poncho, india-rubber hat with a stiff brim at least three inches wide, thick double-soled kip-skin boots, with the leg reaching to the knee, and a pair of rubber gloves, should be furnished each man to enable him with safety to his health to perform the duties required of him as a soldier."]

The opinions of the reporting officers may be found in *Statement I.*

ADDITIONAL ARTICLES.

It has been assumed throughout this entire report that the soldier, equally with the civilian, needs artificial protection from the inclemency of the weather, varying in degree of warmth with the intensity of the season. There are some posts where the cold is represented by twenty-five degrees below zero, and lower, in the winter. Active operations then are practically impossible, but a certain amount of guard and police duty must always be performed regardless of the weather. At such posts it is strenuously urged that there be provided for the use of the guard and a few others outer garments of buffalo-robe sufficient to entirely envelop the wearers. Parkes says of leather, "It is an extremely warm clothing, as no wind blows through it, and is therefore well adapted for cold, windy climates. * * * In Canada, coats of sheepskin or buffalo-hide have been found very useful, and are commonly used for sentries." "In very cold countries, sheepskin and buffalo-hide coats, especially the former, are very useful. No wind can blow through them; in the coldest night of their rigorous winter the Anatolian shepherds lie out in their sheepskin coat and hood without injury, though unprotected men are frozen to death." In fact our men do wear them in many places, but what is here recommended is that they be furnished at such posts by the supreme authority.

It is simply justice that where a man is placed in positions of extraordinary exposure he should be sustained materially as well as morally by those upon whom the responsibility rests. The same argument applies equally to the less extreme but still severe exposure that the greater part of the army endures in the winter as to hands and feet. It is estimated that during that season one-eighth of the garrison is disabled for several weeks by frost-bitten extremities at an average post in Dakota, and proportionately elsewhere. Apart from humanity, it is a plain case of economy to adequately clothe these men. For the sake of appearance and for the sake of protection white gloves in summer for dress, and warm gloves or gauntlets in winter are urged as an addition. For the feet boots, buffalo overshoes and leggings should be allowed.

The views of officers are recorded in *Statement M*, to which attention is respectfully invited.

GENERAL CONSIDERATIONS.

In concluding this exposition of the views of your Corps I have the honor, General, to present for your consideration certain other features which could not well be introduced under previous or individual headings.

The issue of an allowance varying in quantity as well as in kind with the station is one of these. This plan has not been adopted in our service, although it is common in other armies. By establishing, as at present, a standard money-value appropriate for the stations of the mass of the army, it can be ordered that for exceptional posts additional articles may be drawn in kind (and in kind only) as needed. This appears particularly desirable at those places where the men are much employed in the severe labor of building quarters and cultivating post farms, or exposed to deep snows and excessive cold of long continuance. By such an arrangement no partiality is shown any class, and no injustice is done those whose wear and tear is increased by the special character of their extra-military labors or whose health requires unusual protection.

Another point is the regulation of the duties and charges of the company tailors. It is advised that they be employed in the same manner that company saddlers and company blacksmiths now are, and inasmuch as the government professes to clothe the soldier, it should do so in a complete manner. It is a species of fraud to compel him to adapt his uniform at his own expense. In practice, although presumed regulated by the councils of administration, the charges of these men amount to extortion and form a very serious drain on the resources of their comrades. Brevet Lieutenant Colonel Irwin, at Fort Riley, writes, "the extravagant charges permitted to be made by company tailors—three to five dollars for altering a pair of pantaloons, five to ten dollars for altering a coat, should be peremptorily prohibited as it deters most of the men from

having their clothing fitted so as to benefit them to the full extent of its capacity." Assistant Surgeon M. K. Taylor, from Fort Brady, writes, "the necessary expense to the men for these alterations has amounted in most instances for pants and coat to five or six dollars. I speak of no fancy fitting, but of a necessary change to make the clothing fit decently and give the necessary soldierly appearance."

It has been advised and it is worthy of consideration that the Quartermaster's Department furnish the cloth in the piece, to be actually made up by the company tailors. If accurately cut patterns are furnished the different posts this may be possible, but it is doubtful whether competent tailors can be found in all the companies. (If it should be attempted, stringent orders must be enforced against the addition of regimental facings or trimmings, in favor of which there is a feeling on the part of some officers of the line. These, while possessing the charm of variety and fostering esprit, so complicate the question of supply as to make it impossible when suddenly demanded on a large scale. A notable illustration is found in the case of the British army in the Crimea.)

The scandalous frauds perpetrated upon it, are the best argument that government should take into its own hands the manufacture of the cloth. It is possible the nominal cost may be a little greater, but in the end it would be economical in every respect, while it would at least insure a uniformity in color and quality now so wanting. Her last war drove England to this measure. We have the same pressing reasons that impelled her, and we should not delay in learning the lesson of success which she is teaching. It is respectfully suggested that, in connection with any of our great arsenals of construction—say Rock Island—(whether the clothing be retained with the overburdened Quartermaster's Department or not,) power and other facilities could easily be found at no additional cost. The miserable tissues furnished the army call very loudly for some substitute.

Germane to this is the question of rendering the uniform a distinctive and honorable dress for the soldier. This entire report is an earnest argument to make it comfortable and healthful, but it should be more. All those external marks that we call soldierly are connected with the carriage and dress of the man, and the reflex action they exert upon his esprit and health are marked. To obtain his utmost efficiency there should be fostered the feeling of superiority. This cannot be done while the soldier sees laborers in the streets and hackmen on their boxes clothed in his own garb. The universal use of military clothing destroys the caste feeling in the soldiery which is essential to the highest development of martial qualities. The remedy, which has more than once been publicly stated, is easy. Adopt a distinctive army color and forbid the soldier to possess civilian's clothes and the civilian soldier's. This is a legitimate subject for legislation. When the soldier is discharged, furnish

him with a civilian's suit and have his coat and trousers turned in. The apparent extravagance will be more than balanced by the check established upon desertions and the closure of the traffic in clothes for liquor. This is the argument that would change and properly change the hue of the overcoat to dark-blue. When our soldiers are marked men and proud men we shall have a better army.

In conclusion; the perusal of the various *Statements* appended to this Report will show the interest and intelligence with which the medical officers have discussed the subject. There will be found described errors and horrors belonging to the existing uniform that could be barely touched upon in the foregoing pages, and fertile suggestions for their relief that were equally lightly passed over. Underlying the whole is the conviction that while our army is surpassed by none in parts of its equipment and in the wonderful achievements it has accomplished, there will be open to it the avenue of still greater efficiency and success when its daily government shall be guided by the teachings of rational preventive medicine and hygiene.

A list of the officers from whose papers this report is compiled is appended, arranged according to the various Departments. The entire reports of Drs. Head, Perin, Summers, Milhan, Page, Irwin, Gray, Spencer, A. F. Mechem, Winne, Storow, M. K. Taylor, Phillips, Warfield and Walsh. [and of Drs. Edgar, McClellan, Huntington, Caldwell, Hoff, Axt and McCandless,] are commended to your notice.

I have the honor, General, to be,

Very respectfully,

Your obedient servant,

ALFRED A. WOODHULL,

Assistant Surgeon and Brevet Lieutenant Colonel, U. S. Army.

[The *Statements* and list referred to are omitted from this printed paper on account of their voluminousness.]



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